ANL/ESH-HP-98/03

BUILDING 594 WASTE ION EXCHANGE FACILITY FINAL SURVEY REPORT

ARGONNE NATIONAL LABORATORY ARGONNE, ILLINOIS

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October 1998

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Characterization Performed and Report Prepared by
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TABLE OF CONTENTS

TABLES

FIGURES

BUILDING 594 WASTE ION EXCHANGE FACILITY
FINAL SURVEY REPORT

I. INTRODUCTION

The decontamination and demolition of the Waste Ion Exchange Facility (Building 594) was completed in September, 1998. Descriptions of these processes are included in this Final Report. The following information is included:

- History of the Waste Ion Exchange Facility
- Instruments and Calibrations
- Overview of the Decontamination and Demolition Activities Performed
- Results of Health Physics Final Surveys
- Summary of Completion Status

II. HISTORY

The Waste Ion Exchange Facility building 594, (formerly 579) was a prefabricated, galvanized, metal building, 20 ft. wide by 32 ft. long by 14 ft. high (see Figure 1). It was constructed in the 1950's to enclose the waste ion exchange system that was used to process waste fluids from a collecting lagoon. The building contained ion exchange equipment that was connected to the collecting lagoon, equalization tanks, and Building 592 (formerly Bldg. 575) distribution pit by underground piping (see Figure 2). There were influent lines on the east side of the building and an effluent line on the north side of the building.

The main components inside the Waste Ion Exchange Facility were the ion exchange vessels and associated piping located on the east side of the building (see Figure 3). The numbered components are identified in Table 1. Normal access to the facility was through doorways located on both the north and south ends of the building.

FIGURE 1 Waste Ion Exchange Facility, Building 594

III. INSTRUMENTATION , CALIBRATION

Instruments were chosen to assure that the MDAs for the selected instrument/technique was less than the release criteria. A listing of the principal instruments used and their typical MDAs is given in Table 2. Photographs of the principal instruments used for final surveys are shown in Figures 4 through 7 . Instrument calibration records and daily instrument check records are included in Appendix A.

IV. RELEASE GUIDELINES

Table 3 is a summary of the free-release criteria associated with surfaces contaminated with radioactive materials. The release criteria for Transuranics and ^{90}Sr were used for the unrestricted release of nonporous materials from this project.

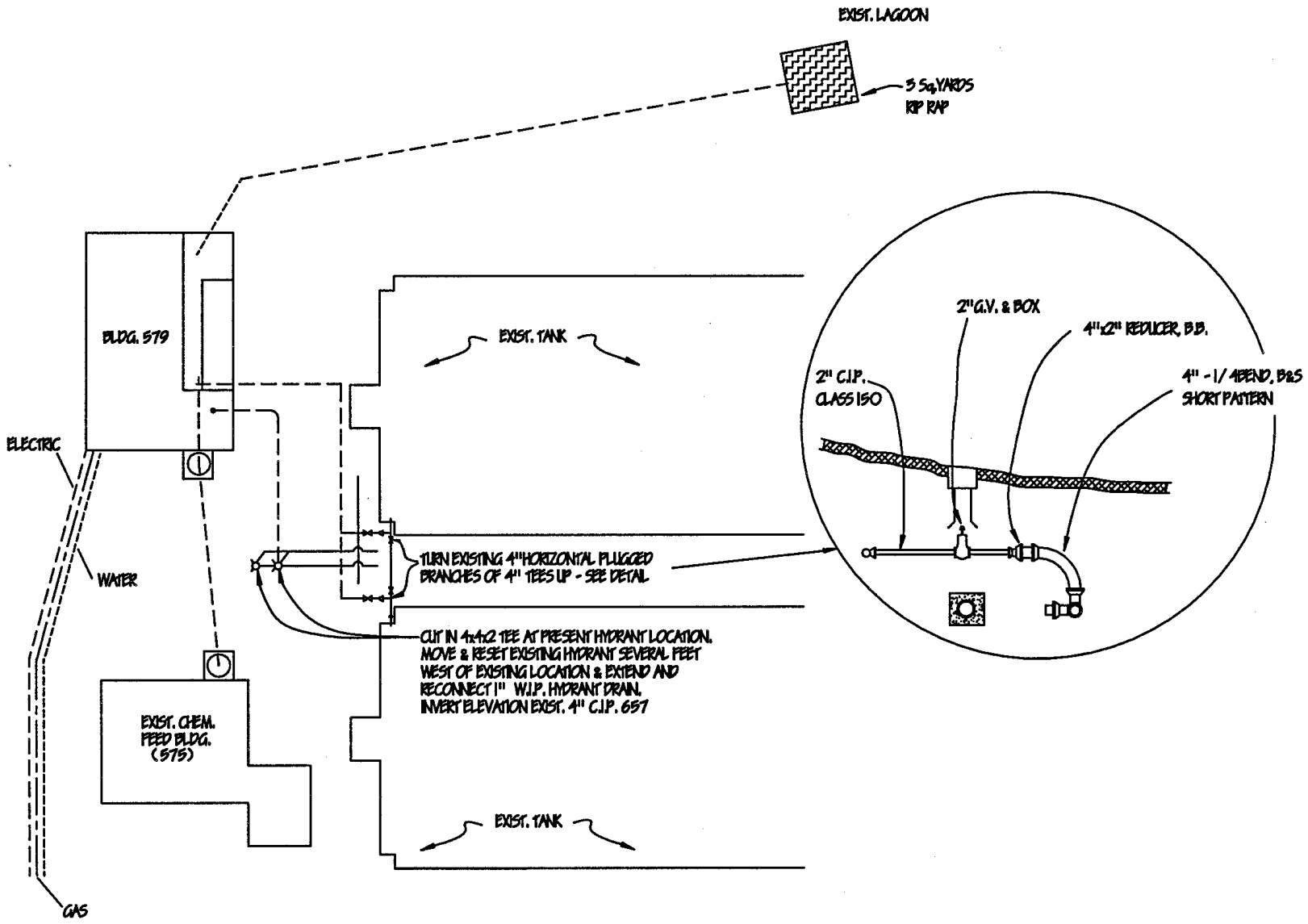

FIGURE 2 Building 594 Piping to Adjacent Facilities

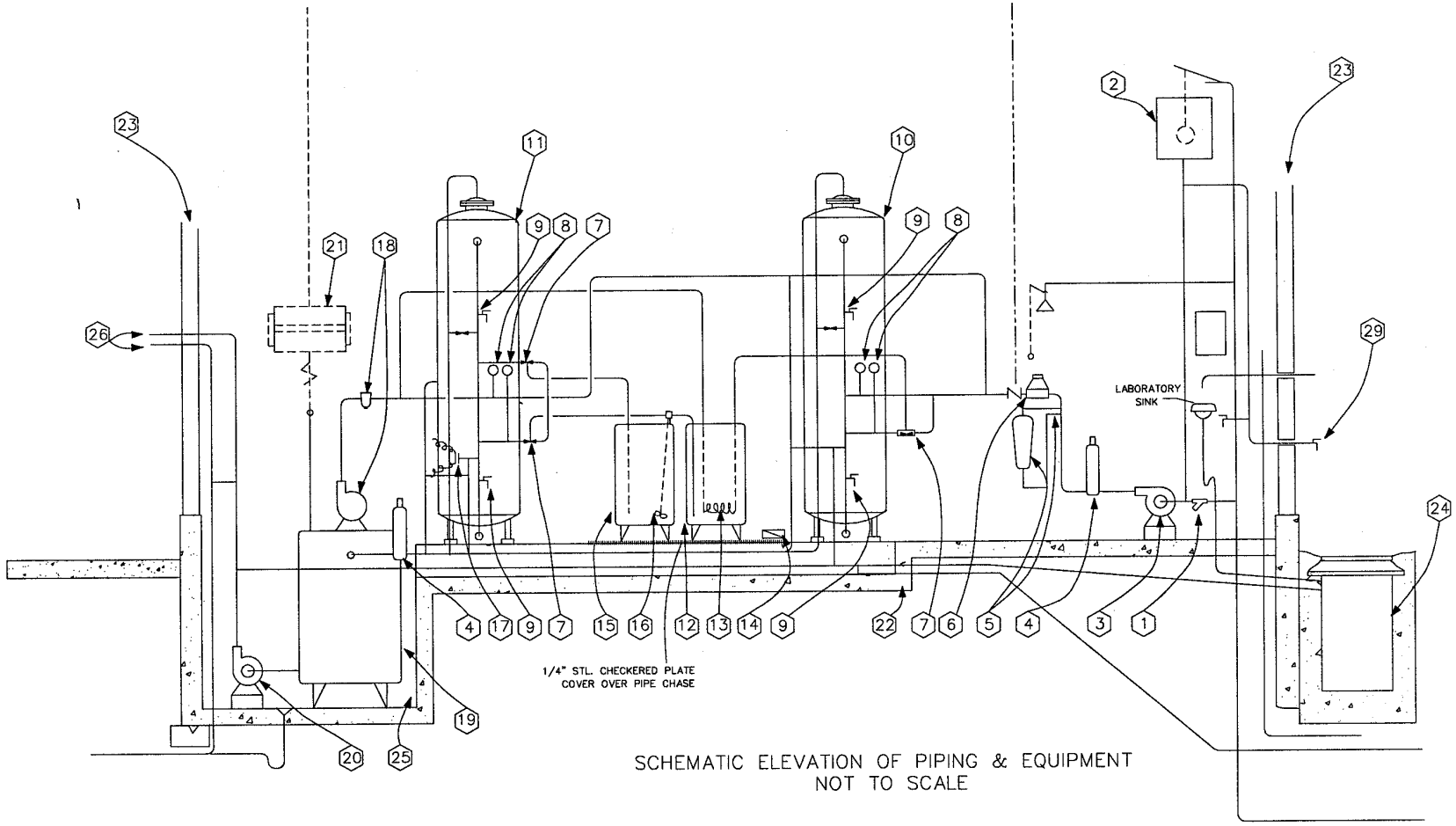

FIGURE 3 Building 594 Ion Exchange Piping & Equipment

TABLE 1 Component Numbers and Names (The component numbers and names show in Figure 3.)

Number	Name
1	Strainer with Monel Screen
2	50 gal Surge Tank
3	Forwarding Pump
4	Influent & Effluent Filters
5	Flow Indicator
6	Water Meter
7	Acid & Caustic Ejectors
8	Inlet & Outlet Pressure Gauges
9	Inlet & Outlet Sampling Cocks
10	Cation Exchange Vessel
11	Mixed Bed Exchange Vessel
12	Acid Regenerant Tank
13	Lead Grid Agitator
14	Acid Foot Pump
15	Caustic Regenerant Tank
16	Caustic Mixer
17	Conductivity Indicator
18	Blower
19	Closed Drain Tank
20	Drain Pump
21	Filter
22	Trench
23	Building
24	Catch Basin
25	Pit
26	Effluent Pipe
27	Miscellaneous items in the building
28	Exchanger Testing Equipment
29	Influent Pipe
30	Air Samples

TABLE 2 Instruments Used for Decontamination and Demolition

Purpose	Instrument	Detector Description	Measurement Units	Typical Characteristics	Typical MDA[a]
Total Surface (α)	NE Technology, Ltd. ELECTRA	Dual Scintillator 100 cm^2 sampling area 0.5 mg/cm^2	cpm	21% ^{241}Am efficiency, 30 sec residence time, ≤7 cpm background	98 dpm
Total Surface (β-γ)	NE Technology, Ltd. ELECTRA	Dual Scintillator 100 cm^2 sampling area ~ 6 mg/cm^2	cpm	29% ^{90}Sr-Y efficiency, 30 sec residence time, ≤400 cpm background	410 dpm
Removable Surface (α)	Tennelec APC	Gas Proportional 5 cm dia. 0.1 mg/cm^2	cpm	30% ^{241}Am efficiency, 2 min count time, ≤1 cpm background	17 dpm
Removable Surface (β-γ)	Tennelec APC	Gas Proportionall 5 cm dia. 0.1 mg/cm^2	cpm	42% ^{90}Sr-Y efficiency, 2 min count time, ≤40 cpm background	86 dpm
Removable Surface (α)	DABRAS	Gas Proportional 200 cm^2 0.4 mg/cm^2	cpm	27% ^{241}Am efficiency, 2 min count time, ≤2 cpm background	18 dpm
Removable Surface (β-γ)	DABRAS	Gas Proportional 200 cm^2 0.4 mg/cm^2	cpm	49% ^{90}Sr-Y efficiency, 2 min count time, ≤270 cpm background	86 dpm
Find Elevated x-γ	Eberline PRM 5-3 with PG-2 detector	5 cm diameter x 2 mm thick NaI (Tl)	cpm	2 sec residence time 500 cpm background	1500 cpm net

[a] Note: The typical MDA for the NE Technology, Ltd. ELECTRA, the Ludlum Model 3 and the Eberline PRM 5-3 with a PG-2 detector is based upon the use of audio output to enhance the discernment of recordable measurements.

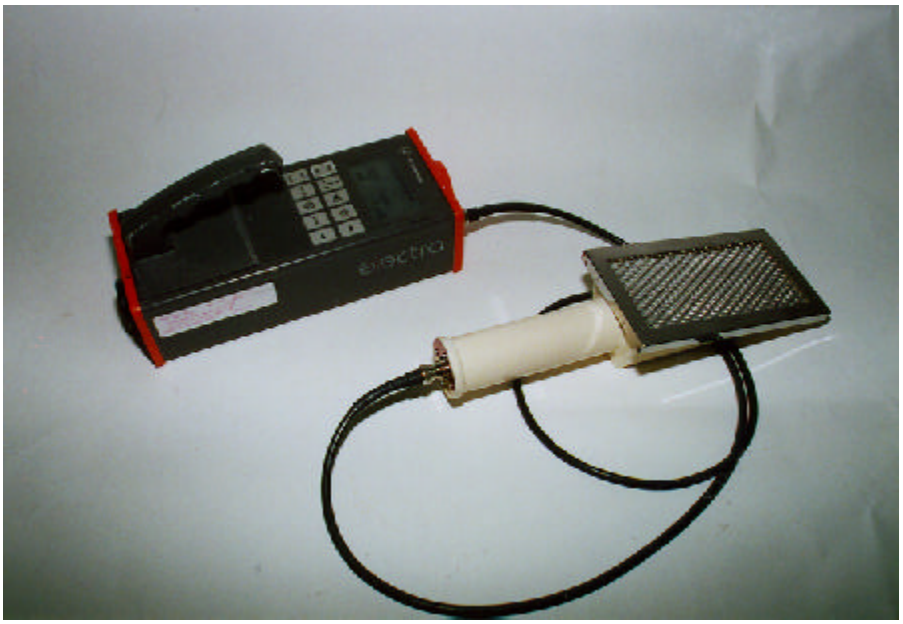

FIGURE 4 NE Technology Model Electra with 100 cm^2 Detector for Measuring αβγ Surface Contamination

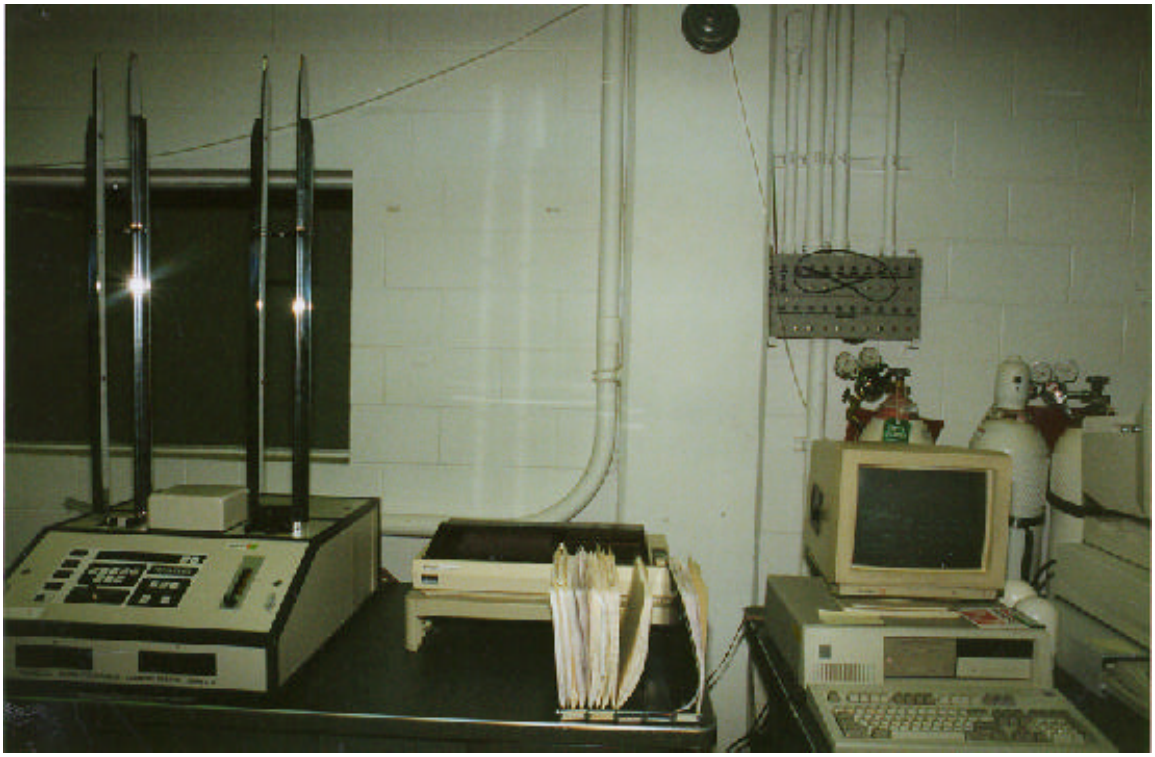

FIGURE 5 Tennelec APC MII Smear Counting System

FIGURE 6 Dual Alpha Beta Radioactivity Assay System (DABRAS) for smear counting

FIGURE 7 Eberline PRM-5-3 with PG-2 Scintillation Detector (2" × 2 mm thick NaI detector)

TABLE 3 Surface Contamination Free-Release Criteria (dpm/100cm^2)

Total (fixed and removable) Radionuclides	Average	Maximum	Removable
Transuranics, I-125, I-129, Ra-226, Ac-227, Ra-228, Th-228, Th-230, Pa-231	100	300	20
Th-Natural, Sr-90, I-126, I-131, I-133, Ra-233, Ra-224, U-232, Th-232	1,000	3,000	200
U-Natural, U-235, U-238, and associated decay product, alpha emitters	5,000	15,000	1,000
Beta-gamma emitters (except Sr-90)	5,000	15,000	1,000

V. OVERVIEW OF THE DECONTAMINATION AND DEMOLITION ACTIVITIES

Major tasks performed during the decontamination and demolition of the Waste Ion Exchange Facility were as follows:

1. Removal of all excess equipment: Lockers, shelving, motors, copper pipe, and miscellaneous materials were surveyed by the ANL-E ESH Health Physics Section personnel and released for recycling or disposal as trash. All external piping from the floor drains were removed and surveyed for release.

2. Resin was removed from the Cation Exchange Vessel and the Mixed Bed Exchange Vessel. The resin was packaged into 55 gallon drums as low-level radioactive waste for disposal by Waste Management Personnel.

3. The Cation Exchange Vessel and the Mixed Bed Exchange Vessel (See Figure 8) were then removed, placed on their sides and vacuumed by WMO. The tanks were surveyed, size reduced, and disposed of as clean scrap metal.

4. All motors, piping, retention tank, and associated equipment were surveyed and removed. A hole had to be cut into the retention tank to remove the water which was pumped by WMO into a dempster tank. This water was then processed through WMO's retention tank water treatment system. The retention tank was then surveyed again and released as clean scrap.

5. HEPA filter material was surveyed as clean and disposed of by WMO.

FIGURE 8 Health Physics Survey of the Cation Exchange Vessel, Mixed Bed Exchange Vessel and Equipment

6. Catch Basin: The catch basin (#24 in Figure 3) was left in place. The piping from the basin is connected to a laboratory tank and equalization tank in building 592 (575 in Figure 2). A water sample from the catch basin was less than ten times the site release criteria. As found during the characterization, the catch basin had γ activity above the ambient background. The catch basin sample taken during the characterization appeared to contain only naturally occurring radionuclides. The activity levels are below the unrestricted release criteria. Therefore, the catch basin is released for unrestricted use.

7. Tritium Survey: Four smears were taken from areas in Building 594 that were deemed to be most likely to contain residual tritium (Appendix B). Values for these smears were less than 10% of the unrestricted release criteria for beta-gamma emitters of 1,000 dpm/100cm^2.

8. No contamination was detected on the final surveys of the walls, windows, doors, ceilings, exhaust pipe from ceiling. The building and associated concrete was released for demolition by memo to E. Wiese (TD) from C.M. Sholeen (ESH-HP), dated July 30, 1998 (Appendix B).

9. Building 594 and associated piping and concrete were demolished and removed as scrap in September, 1998. On September 11, 1998, ESH Health

Physics personnel surveyed the piping that was inaccessible under the concrete (See Figure 9). Pipes involved were those pipes that ran from under the concrete to the north pit drain and east pit drain leading to the water treatment settling basin. No contamination was detected. The north drain line was removed to three feet outside of the foundation of the building. The east drain line was removed to the foundation of building 593 (see Figure 1).

10. Direct and Smear Results: Health Physics results are listed in Appendix C.

VI. SUMMARY

The Waste Ion Exchange Facility was free released for demolition on July 30, 1998. No surprises or unknowns were noted. The building and associated piping were demolished and removed in September, 1998. The north drain line was removed to three feet outside of the foundation of the building. The east drain line was removed to the foundation of Building 593. The piping located in the north pit drain and east pit drain (which were located under the concrete) were free released. The catch basin, which was located on the south side of the building and also connected to equalization tanks in building 592, was released for unrestricted use and was left intact.

FIGURE 9 Health Physics Survey of Piping from beneath Building 594 Concrete Pad

VII. REFERENCES

1. USNRC Regulatory Guide 1.86, “Termination of Operating Licenses for Nuclear Reactors” l974.

2. DOE Order 5400.5, “Radiation Protection of the Public and the Environment” (1990).

3. Draft DOE Rule 10 CFR 834, “Radiation Protection of the Public” (1995).

4. “Building 579 Waste Ion Exchange Facility Characterization Report” C.M. Sholeen, D.C. Geraghty, Argonne National Laboratory, Argonne, Illinois, ANL/ESH-HP-97/01, March, 1997.

5. “Health and Safety Plan for the Decontamination and Decommissioning of Building 594 Waste Ion Exchange Facility”, R. Hysong, E. Wiese, Argonne National Laboratory, Argonne, Illinois, May, 1998.

APPENDIX A:

INSTRUMENT CALIBRATION & OPERATIONAL CHECK RECORDS

Certificate #018-A1
rev. 1.0, June 1993

INSTRUMENT MAINTENANCE/CALIBRATION CERTIFICATE

Set#: 17 Procedure#: **018** Configuration: **Scintillator**
Type: _X_ 2 mm NaI

Unit#: 4417 Mfr/Model: **Eberline PRM-5-3** S/N: 2903
Unit#: 2682 Mfr/Model: **Eberline PG-2** S/N: ———

Pulse Generator, Eberline MP- 1, S/N 200
Electrostatic KiloVoltmeter: Brandon, S/N 15374
Source(s): Pu-239 ,S/N 7552 ,Activity 4150000 dpm
Am-241 ,S/N 7551 ,Activity 6028000 dpm
U-235 ,S/N 22B6102 ,Activity 1.06 g foil

I) MAINTENANCE/PRECALIBRATION:

Batteries: I Cabling: _____ Mechanical/Cleanliness: _____

Threshold: 11 mV (fixed at 5 to 10 mV)
Window: 11/13 mV = 25 % (ref.: 25% of Threshold mV)
Audible Function Check: OK

Pre-Calibrator 4/98 Date

II) PRIMARY CALIBRATION:

Range (cpm)	Pulser Rate (cpm)	As Found (cpm)	As Left (cpm)	% Diff. Pulser vs As Left
R2	400	380		
R3	4K	3.7K		
R4	40K	4K		
R5	400K	375K		

With PHA in, adjust HV to maximize detector response to isotope of interest:

Mode	Isotope	Response As Found (cpm)	Response As Left (cpm)	Efficiency (If Applicable) (%)
HV- 1	Pu-239	10K	10K	N/A
HV- 2	Am-241	200K	200K	N/A
HV- 3	U-235	50K	50K	N/A

Mode of Operation: **HV- 1** , **Gross**
Ambient Bkgd in chosen Oper. Mode: 1K cpm (ref.: > 300 cpm)

REMARKS: I- batteries II- re-set windows

Primary-Calibrator 4/29/98 Date

Certificate #015-D2
rev. 1.2, March 1997

INSTRUMENT MAINTENANCE/CALIBRATION CERTIFICATE

Set#: 505 Procedure#: **015** Configuration: **Surface Contam**
Type: **X** Dual Scintillator (**dpm units**)
Unit#: 4965 Mfr/Model: **NE Technology Electra** S/N: _____
Unit#: 6909 Mfr/Model: **NE Technology DP6A** S/N: 573

Pulse Generator, Eberline MP- 2, S/N 775
Electrostatic KiloVoltmeter: ESD 9, S/N 13443
Alpha Source: AM241, S/N D996[illegible], Activity 68960 dpm
Beta Source: SR90, S/N 98970, Activity 98970 dpm

I) MAINTENANCE/PRECALIBRATION:
Window: ✓ Cabling: ✓ Mechanical/Cleanliness: ✓
Battery Voltage (Parameter # 0): 4.3 (ref: > 4)
Threshold: 30 (verify 25 mV with the MiniPulser)
Count Rate Check @ 10 k cpm: ✓
HV Calib.: ✓ (compare Parameter #3 w/ the Electrostatic)

High Voltage Adjustment:
Temporarily raise ULD. Using Sr-90 source, observe count rate in beta channel as a function of HV. Adjust HV to 50 V above the knee of the plateau. HV = 870, and INHIBIT: ✓
Now bring down the ULD so that count rate in alpha channel is approx. 0.1% or less of count rate in beta channel.
Beta cpm: 28.7K Alpha cpm: 2 (e.g., 2.1 % of beta)
ULD (Parameter #6): 2.0 V (ref: 2.00 V), then INHIBIT: ✓

Parameter Settings:
As the Electra "supervisor" (i.e., the internal switch S1-2 to ON), set the remaining parameters as follows:
Parameter #1 (Alarm Level): OFF, then INHIBIT: ✓
Parameter #4 (Overload Current): 10 µA, then INHIBIT: ✓
Parameter #5 (Deadtime): 3 µsec, then INHIBIT: ✓
Parameter #8 (Units): cpm
Parameter #A (inhibit bkgd subt): set to ON
Parameter #b (inhibit integrate): set to OFF
Parameter #C (rate mode): set to Auto
Parameter #E (pulse mode): set to dUAL
Parameter #F (ohms): set to S66

II) PRIMARY CALIBRATION:
Response to Alpha Std: 12.9K cpm; .201 % efficiency (alpha)
Alpha Mode Bkgd: 4 cpm (ref.: < 7 cpm)
Response to Beta Std: 28.7K cpm; .289 % efficiency (beta)
Beta Mode Bkgd: 307 cpm (ref.: < 400 cpm)
Integrate Check: ✓ Audible Functional Check: ✓

Parameter #8 (Units): change from cpm to **dpm**
Parameter #9 (Efficiencies): enter efficiencies from above
Now set switch S1-2 back to OFF (user), and leave switch S1-3 set to ON (hide). ✓

REMARKS: _____

Calibrated by: Jerry Letizia Date: 8/11/98

Certificate #018-A1
rev. 1.0, June 1993

INSTRUMENT MAINTENANCE/CALIBRATION CERTIFICATE

Set#: 96 Procedure#: **018** Configuration: **Scintillator**
Type: **X** 2 mm NaI

Unit#: 4534 Mfr/Model: **Eberline PRM-5-3** S/N: 2912
Unit#: 7973 Mfr/Model: **Eberline PG-2** S/N: ———

Pulse Generator, Eberline MP- 1, S/N 200
Electrostatic KiloVoltmeter: GRawson, S/N 15374
Source(s): Pu-239 ,S/N 7552 ,Activity 4150000 dpm
Am-241 ,S/N 7551 ,Activity 6028000 dpm
U-235 ,S/N 22B6102 ,Activity 1.06 g foil

I) MAINTENANCE/PRECALIBRATION:

Batteries: I Cabling: IIII Mechanical/Cleanliness: III

Threshold: 8 mV (fixed at 5 to 10 mV)
Window: 10 mV = 25 % (ref.: 25% of Threshold mV)
Audible Function Check: OK

Pre-Calibrator 8/5/98 Date

II) PRIMARY CALIBRATION:

Range (cpm)	Pulser Rate (cpm)	As Found (cpm)	As Left (cpm)	% Diff. Pulser vs As Left
R2	400	420	400	
R3	4K	4.2K	3.9K	
R4	40K	40K	42K	
R5	400K	360K	400K	

II

With PHA in, adjust HV to maximize detector response to isotope of interest:

Mode	Isotope	Response As Found (cpm)	Response As Left (cpm)	Efficiency (If Applicable) (%)
HV- 1	Pu-239	5K	6K	N/A
HV- 2	Am-241	250K	260K	N/A
HV- 3	U-235	100K	110K	N/A

II

Mode of Operation: **HV- 1** , **Gross**
Ambient Bkgd in chosen Oper. Mode: 250 cpm (ref.: > 300 cpm)

REMARKS: I- batteries II- re-cal
III- cleaned. IIII- repair cable

Primary-Calibrator 8/5/98 Date

Certificate #015-D2
rev. 1.2, March 1997

INSTRUMENT MAINTENANCE/CALIBRATION CERTIFICATE

Set#: 1053 Procedure#: **015** Configuration: **Surface Contam**
Type: **X** Dual Scintillator (**dpm units**)
Unit#: 5493 Mfr/Model: **NE Technology Electra** S/N: 513
Unit#: 6817 Mfr/Model: **NE Technology DP6A** S/N: 605

Pulse Generator, Eberline MP-2, S/N 775
Electrostatic KiloVoltmeter: ESD 9, S/N 13443
Alpha Source: AM241, S/N DV961, Activity 63970 dpm
Beta Source: SR90, S/N DN631, Activity 98970 dpm

I) MAINTENANCE/PRECALIBRATION:
Window: ✓ Cabling: ✓ Mechanical/Cleanliness: ✓
Battery Voltage (Parameter # 0): 4.5 (ref: > 4)
Threshold: 30 (verify 25 mV with the MiniPulser)
Count Rate Check @ 10 k cpm: 10K
HV Calib.: ✓ (compare Parameter #3 w/ the Electrostatic)

High Voltage Adjustment:
Temporarily raise ULD. Using Sr-90 source, observe count rate in beta channel as a function of HV. Adjust HV to 50 V above the knee of the plateau. HV = 820, and INHIBIT: ✓
Now bring down the ULD so that count rate in alpha channel is approx. 0.1% or less of count rate in beta channel.
Beta cpm: 28K Alpha cpm: 6 (e.g., <.1 % of beta)
ULD (Parameter #6): 2.0 V (ref: 2.00 V), then INHIBIT: ✓

Parameter Settings:
As the Electra "supervisor" (i.e., the internal switch S1-2 to ON), set the remaining parameters as follows:
Parameter #1 (Alarm Level): OFF, then INHIBIT: ✓
Parameter #4 (Overload Current): 10 µA, then INHIBIT: ✓
Parameter #5 (Deadtime): 3 µsec, then INHIBIT: ✓
Parameter #8 (Units): cpm
Parameter #A (inhibit bkgd subt): set to ON
Parameter #b (inhibit integrate): set to OFF
Parameter #C (rate mode): set to Auto
Parameter #E (pulse mode): set to dUAL
Parameter #F (ohms): set to S66

II) PRIMARY CALIBRATION:
Response to Alpha Std: 13.1K cpm; .204 % efficiency (alpha)
Alpha Mode Bkgd: 4 cpm (ref.: < 7 cpm)
Response to Beta Std: 28K cpm; .282 % efficiency (beta)
Beta Mode Bkgd: 255 cpm (ref.: < 400 cpm)
Integrate Check: ✓ Audible Functional Check: ✓

Parameter #8 (Units): change from cpm to **dpm**
Parameter #9 (Efficiencies): enter efficiencies from above
Now set switch S1-2 back to OFF (user), and leave switch S1-3 set to ON (hide). ✓

REMARKS:

Calibrated by: Jerry Kitzig Date: 5/19/98

Certificate #006, Page 1
rev. 0.3, Dec. 1995

INSTRUMENT MAINTENANCE/CALIBRATION CERTIFICATE

Set#: 1753 Procedure#: **006** Configuration: **Assay System**
Description: **DABRAS with Counter- 1 _X_ 2 ___**

Unit#: 14 Mfr/Model: **ANL-E DABRAS** S/N: 14
Unit#: ~~7654~~ Mfr/Model: **EG&G Berthold MZ200** S/N: ~~5548~~
Unit#: _____ Mfr/Model: _____ S/N: _____

Pulse Generator, Eberline MP-2, S/N: 775
Voltmeter: Fluke 83, S/N 46600185
Alpha Source AM 241, S/N DV961, Activity 03910
Beta Source Sr 90, S/N DV631, Activity 10406

I) MAINTENANCE/PRECALIBRATION:

Detector Window(s): ✓ Cable(s): ✓ Other Mechanical: ✓
Keyboard & Monitor Check: ✓ Audible Function Check: ✓
Note: If full precalibration is required, go to page 2.

II) PRIMARY CALIBRATION:

DABRAS Software Date (on splash screen): 6/28/97
Counter 1 utilizes MZ200 S/N: 7654
Counter 2 utilizes MZ200 S/N: —
Address Select Thumbwheel Setting (ref: 7): 7

	Counter 1	**Counter 2**
DABRAS-Supplied Voltages:		
+15 Vdc Power Supply	15.01	
-15 Vdc Power Supply	-15.06	
HV Control (ref: 4.5 Vdc)	4.5	
Responses to MP-2 Line Driver Output:		
With MP unit set for 80k cpm, observe channel responses.		
Alpha Channel (ref: 40k cpm ± 1%)	40K	
Beta Channel (ref: 40k cpm ± 1%)	40K	
Determination of Instrument Parameters:		
With an empty tray, initiate the 100-minute background count:		
Alpha Background (ref: ≤4 cpm)	2.68	
Beta Background (ref: ≤350 cpm)	284.17	
Measured efficiencies after the 10-minute standard counts:		
Alpha Efficiency (ref: 26 ± 3%)	.253	
Beta Efficiency (ref: 49 ± 3%)	.483	
"Convince-Yourself" Check of Standard dpm values: (α std.)	✓	
(ß std.)	✓	

REMARKS: 2 64900
$113000

Calibrated By: Jerry Kitzia Date: 1/28/98
Re-Calibration Due Date: 1/99

Certificate #006, Page 1
rev. 0.3, Dec. 1995

INSTRUMENT MAINTENANCE/CALIBRATION CERTIFICATE

Set#: 1714 Procedure#: **006** Configuration: **Assay System**
Description: **DABRAS with Counter- 1 _X_ 2 X**

Unit#: 16 Mfr/Model: **ANL-E DABRAS** S/N: 16
Unit#: 9991 Mfr/Model: **EG&G Berthold MZ200** S/N: 661
Unit#: 6177 Mfr/Model: " " S/N: 1397

Pulse Generator, Eberline MP-2, S/N: 775
Voltmeter: Fluke 83, S/N 46600185
Alpha Source Am 241, S/N DV961, Activity 6391.0
Beta Source Sr/Y 90, S/N DD031, Activity 10490.6

I) MAINTENANCE/PRECALIBRATION:

Detector Window(s): ✓ Cable(s): ✓ Other Mechanical: ✓
Keyboard & Monitor Check: ✓ Audible Function Check: ✓
Note: If full precalibration is required, go to page 2.

II) PRIMARY CALIBRATION:

DABRAS Software Date (on splash screen): 6/28/97
Counter 1 utilizes MZ200 S/N: 9991
Counter 2 utilizes MZ200 S/N: 6177
Address Select Thumbwheel Setting (ref: 7): 7

	Counter 1	**Counter 2**
DABRAS-Supplied Voltages:		
+15 Vdc Power Supply	14.99	15.00
-15 Vdc Power Supply	-15.08	-15.08
HV Control (ref: 4.5 Vdc)	4.5	4.5
Responses to MP-2 Line Driver Output:		
With MP unit set for 80k cpm, observe channel responses.		
Alpha Channel (ref: 40k cpm ± 1%)	40K	40K
Beta Channel (ref: 40k cpm ± 1%)	40K	40K
Determination of Instrument Parameters:		
With an empty tray, initiate the 100-minute background count:		
Alpha Background (ref: ≤4 cpm)	3.12	3.54
Beta Background (ref: ≤350 cpm)	281.92	271.73
Measured efficiencies after the 10-minute standard counts:		
Alpha Efficiency (ref: 26 ± 3%)	.258	.274
Beta Efficiency (ref: 49 ± 3%)	.497	.497
"Convince-Yourself" Check of Standard dpm values: (α std.)	✓	✓
(ß std.)	✓	✓

REMARKS: 55700 α
98000 ß 92892

Calibrated By: Jerry Letuja Date: 1/30/98
Re-Calibration Due Date: 1/99

1825 α 48.1 Bγ

NE Instrument Check Sheet

SOURCE # MANTLE	MINIMUM	α	Bγ
	MAXIMUM	α	Bγ

SERIAL NUMBER	DATE	A PASS	BG PASS	INITIALS	COMMENTS
1053	6/8/98	✓	✓	BHK	
1053	6/9/98	✓	✓	BHK	
1053	6/10/98	✓	✓	BHK	
1053	6/11/98	✓	✓	BHK	
1053	6/12/98	✓	✓	BHK	
1053	6/15/98	✓	✓	BHK	
1053	6/16/98	✓	✓	BHK	
1053	6/17/98	✓	✓	BHK	
505	6/18/98	✓	✓	BHK	
505	6/19/98	✓	✓	BHK	
505	6/22/98	✓	✓	BHK	

PRM 5-3

Source # MANTLE

Minimum 8000 cts/min

Maximum 12000 cts/min

Serial Number	Date	Pass	Comments	Initials
17	6/8/98	✓		BHR
17	6/9/98	✓		BHR
17	6/10/98	✓		BHR
96	6/11/98	✓		BHR
96	6/12/98	✓		BHR
96	6/15/98	✓		BHR
96	6/16/98	✓		BHR
17	6/17/98	✓		BHR
17	6/18/98	✓		BHR
17	6/19/98	✓		BHR
17	6/22/98	✓		BHR

5/18/98 D:\HP\FORMS.306

APPENDIX B:

UNRESTRICTED RELEASE DOCUMENTS

ARGONNE
NATIONAL
LABORATORY

INTRA-LABORATORY MEMO

August 10, 1998

To: T. Yule TD
E. Wiese TD

From: C. M. Sholeen CMS ESH-HP

Subject: **Building 594 Tritium Smear Survey after D&D**

Four smears were taken from areas in Building 594 that were deemed to be most likely to contain residual tritium. The smears were obtained by wiping an area ≥100 cm^2 with a styrofoam type smear media. Each smear was placed in a scintillation vial and dissolved in Liquid Gold scintillation cocktail. A control vial and each vial with a dissolved smear was counted for 2 minutes on a Packard Tri-Carb 1600 TR Liquid Scintillation Analyzer. The table below contains a list of the four smears and the analysis results.

Location	^3H Activity (dpm) gross	net
Control	40.82	0.00
Drain to manhole	72.83	32.01
Drain behind tank	38.70	NCD
Trench	70.05	29.23
Drain in retention area	89.42	48.60

NCD = No Contamination Detected

As seen in the last column, low levels of tritium were detected on three of the four smears. However, these values are less than 10% of the unrestricted release criteria for beta-gamma emitters of 1,000 dpm/100 cm^2. At the present time tritium is included as one of these beta-gamma emitters. There is a possibility that a higher limit will be set for tritium in the future.

cc:
M. J. Robinet

ARGONNE
NATIONAL
LABORATORY

INTRA-LABORATORY MEMO

July 30, 1998

To: E. Wiese TD

From: C. M. Sholeen CMS ESH-HP

Subject: **Health Physics Survey of Building 594 after D&D**
Revision to the memo dated July 17, 1998.

The walls, windows, floors and doors of building 594 were surveyed direct for both α and $\beta\gamma$ contamination. None was detected. Smears of the area had no α or $\beta\gamma$ contamination. Other parts of the building that were surveyed and found to be free from loose and fixed contamination are the HEPA filter and housing, the exhaust pipe that comes down from the ceiling, the outside vent pipe and the pipe going into the floor down to 6 inches below the surface. The ceiling and light fixtures were spot checked and found to be free from loose and fixed contamination. Tritium smears were taken of the trench and 3 drain pipes; low levels of tritium were found. However, all smears were below the tritium release criteria. The building and fixtures are released for unrestricted use.

As found during the characterization, the manhole had direct γ activity above the ambient background. The manhole sample taken during the characterization appeared to contain only naturally occurring radionuclides. The activity levels are below the unrestricted release criteria. Therefore, the manhole is released for unrestricted use.

Items and the resin that were removed from the building were surveyed to determine the appropriate disposal. The results of these surveys and the building surveys were attached to the memo dated July 17, 1998.

cc:
M. J. Robinet

APPENDIX C:

DIRECT & SMEAR SURVEY RESULTS

TABLE C.1 Building 594 Health Physics Survey Results

Date	Item or Area	α Direct	βγ	α Smear	βγ
6/8/98	Locker #2	NCD[a]	NCD	NCD	NCD
6/8/98	Locker #1	NCD	NCD	NCD	NCD
6/8/98	Locker #5	NCD	NCD	NCD	NCD
6/8/98	Shelf #1	NCD	NCD	NCD	NCD
6/8/98	Shelf #2	NCD	NCD	NCD	NCD
6/8/98	Shelf #3	NCD	NCD	NCD	NCD
6/8/98	Bricks #1-5	NCD	NCD	NCD	NCD
6/8/98	Wood ~2" × 12" × 8'	NCD	NCD	NCD	NCD
6/8/98	Motor	NCD	NCD	NCD	NCD
6/8/98	Bricks #6-8	NCD	NCD	NCD	NCD
6/8/98	Electrical panel (face plate)	NCD	NCD	NCD	NCD
6/8/98	2-motors	NCD	NCD	NCD	NCD
6/8/98	1-motor (small)	NCD	NCD	NCD	NCD
6/8/98	Pipe PVC	NCD	NCD	NCD	NCD
6/8/98	Copper pipe	NCD	NCD	NCD	NCD
6/8/98	Couplings - 6	NCD	NCD	NCD	NCD
6/8/98	Misc. fittings	NCD	NCD	NCD	NCD
6/8/98	Shelf #4	NCD	NCD	NCD	NCD
6/8/98	Pipe and site glass	NCD	NCD	NCD	NCD
6/8/98	Floors	—	—	NCD	NCD
6/9/98	Conduit (2)	NCD	NCD	NCD	NCD
6/9/98	Round tank	NCD	NCD	NCD	NCD
6/9/98	Rectangular SS tank	NCD	NCD	NCD	NCD
6/9/98	2 mixers	NCD	NCD	NCD	NCD
6/9/98	South wall #1 (lower)	NCD	NCD	NCD	NCD
6/9/98	South wall #2 (lower)	NCD	NCD	NCD	NCD
6/9/98	South wall #3 (lower)	NCD	NCD	NCD	NCD
6/9/98	East wall #1-4 (lower)	NCD	NCD	NCD	NCD
6/9/98	Bricks 1-12	NCD	NCD	NCD	NCD
6/9/98	West wall (lower) #1 and 2	NCD	NCD	NCD	NCD
6/9/98	PVC pipes	NCD	NCD	NCD	NCD
6/9/98	3 motors	NCD	NCD	NCD	NCD
6/9/98	2 site glasses	NCD	NCD	NCD	NCD
6/9/98	Valves	NCD	NCD	NCD	NCD
6/9/98	Floors	—	—	NCD	NCD
6/10/98	North wall #1	NCD	NCD	NCD	NCD
6/10/98	Railings into retention tank area	NCD	NCD	NCD	NCD
6/10/98	Lids #1 and 2 from tanks	NCD	NCD	NCD	NCD
6/10/98	Wire cord	NCD	NCD	NCD	NCD
6/10/98	Pipes from trench	NCD	NCD	NCD	NCD
6/10/98	Inside tanks #1 (right)	—	—	NCD	NCD
6/10/98	Inside tank #2 (left)	—	—	NCD	180
6/10/98	Floors	—	—	NCD	NCD

TABLE C.1 (Cont.)

Date	Item or Area	α Direct	βγ	α Smear	βγ
6/11/98	West overhead door	NCD	NCD	NCD	NCD
6/11/98	Mixers	NCD	NCD	NCD	NCD
6/11/98	Overhead pipes	NCD	NCD	NCD	NCD
6/11/98	Filter and filter media	NCD	NCD	NCD	NCD
6/11/98	Conduit	NCD	NCD	NCD	NCD
6/11/98	Copper pipes	NCD	NCD	NCD	NCD
6/11/98	West wall near electrical panel	NCD	NCD	NCD	NCD
6/11/98	Floors	—	—	NCD	NCD
6/12/98	Resin stirrers	NCD	NCD	NCD	NCD
6/15/98	Pipe from Tank L	NCD	NCD	NCD	NCD
Drums Containing Resin					
6/12/98	Resin drum #1-R	NA[b]	4,000[c]	NCD	NCD
6/12/98	Resin drum #2-R	NA	13,000	NCD	NCD
6/12/98	Resin drum #3-R	NA	13,000	NCD	NCD
6/12/98	Resin drum #4-R	NA	12,000	NCD	NCD
6/12/98	Resin drum #5-R	NA	3,000	NCD	NCD
6/15/98	Resin drum #1-L	NA	200	NCD	NCD
6/15/98	Resin drum #2-L	NA	200	NCD	NCD
6/15/98	Resin drum #3-L	NA	300	NCD	NCD
6/15/98	Resin drum #6-L	NA	NCD	NCD	NCD
6/15/98	Resin drum #7-R	NA	1,000	NCD	NCD
6/16/98	Pipe going into floor	NCD	NCD	NCD	NCD
6/16/98	Pipes from left column	NCD	NCD	NCD	NCD
6/17/98	Retention tank	NCD	NCD	NCD	NCD
6/17/98	Site glass from left tank	NCD	NCD	NCD	NCD
6/17/98	Trench tops	NCD	NCD	NCD	NCD
6/17/98	Trench	NCD	NCD	NCD	NCD
6/17/98	Socks	NCD	NCD	NCD	NCD
6/17/98	Drain cover in retention area	NCD	NCD	NCD	NCD
6/17/98	Pipe from retention area	NCD	NCD	NCD	NCD
6/17/98	Masonite ring	NCD	NCD	NCD	NCD
6/17/98	Signs	NCD	NCD	NCD	NCD
6/17/98	Retention tank walls, drain, floor	NCD	NCD	NCD	NCD
6/17/98	Ladder	NCD	NCD	NCD	NCD
6/17/98	Pump from retention tank	NCD	NCD	NCD	NCD
6/18/98	Motor	NCD	NCD	NCD	NCD
6/18/98	Filters	NCD	NCD	NCD	NCD

TABLE C.1 (Cont.)

Date	Item or Area	α Direct	βγ	α Smear	βγ
6/19/98	Outside vent pipe	NCD	NCD	NCD	NCD
6/19/98	HEPA filter	NCD	NCD	NCD	NCD
6/19/98	PC-5-catch basin mud	—	<0.1	—	—
6/19/98	55 gallon drum-catch basin mud	—	<0.1[d]	—	—
6/22/98	Table	NCD	NCD	NCD	NCD
6/22/98	HEPA filter and housing	NCD	NCD	NCD	NCD
6/22/98	Floors	NCD	NCD	NCD	NCD
6/22/98	All walls, windows and doors	NCD	NCD	NCD	NCD
6/22/98	Spot checks of ceilings	NCD	NCD	NCD	NCD
6/22/98	Exhaust pipe coming down from ceiling	NCD	NCD	NCD	NCD
Final Survey	Pipes leading to water treatment settling basin	NCD	NCD	NCD	NCD

[a] NCD = No contamination detected.

[b] Resin was wet - no alpha reading taken.

[c] dis/min - 100 cm^2

[d] mR/h